

Single Page Applications

Modular situational awareness tools for data visualization

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In cooperation with:

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Dr. Arto Niemi,

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Dr. Oscar Hernán Ramírez Agudelo

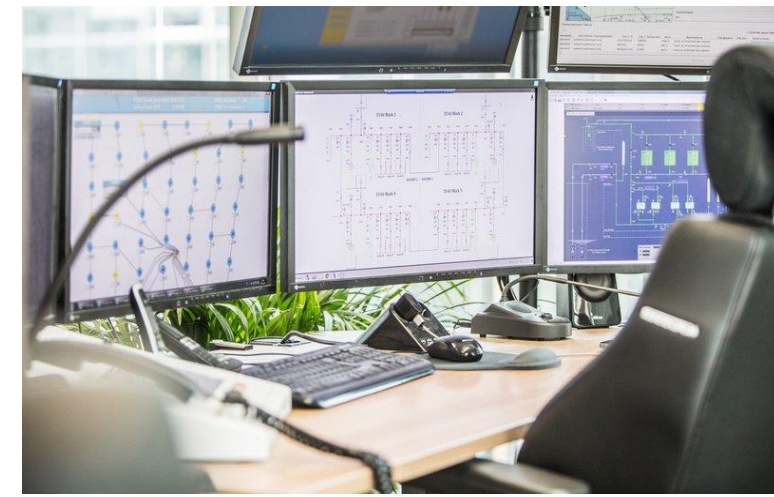
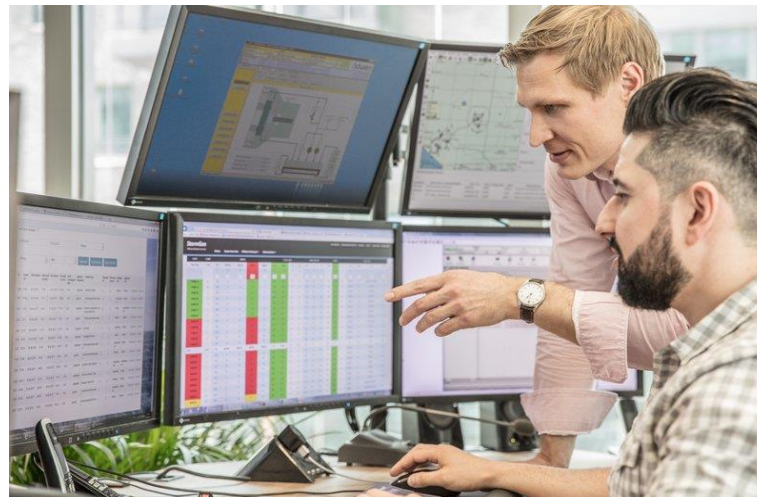


Knowledge for Tomorrow



Introduction KUES

- Core task
 - „Design a GUI that allows to monitor selected indicators of Offshore Wind Farms.“
- For the presentation we will focus on data representation
- Different tasks were important
 - AIS Data
 - Turbine Data
 - Bayesian Network



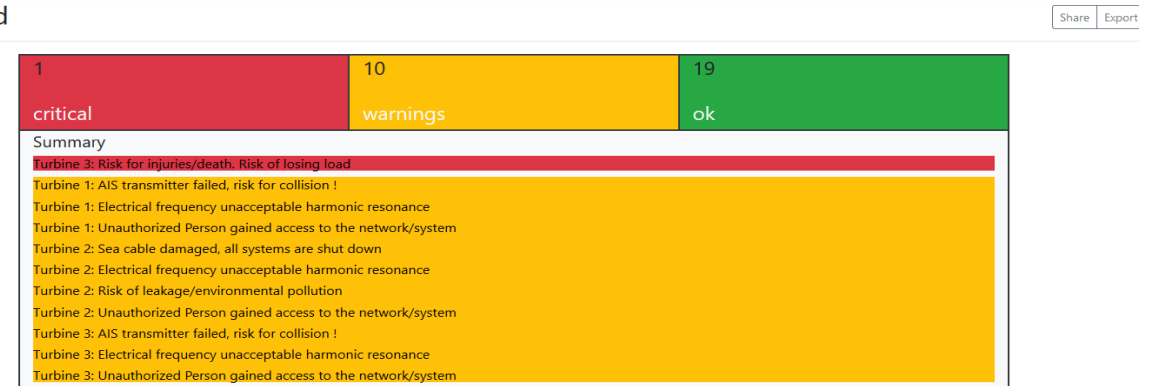
source: Dudgeonoffshorewind.co.uk, Globaltechone.de



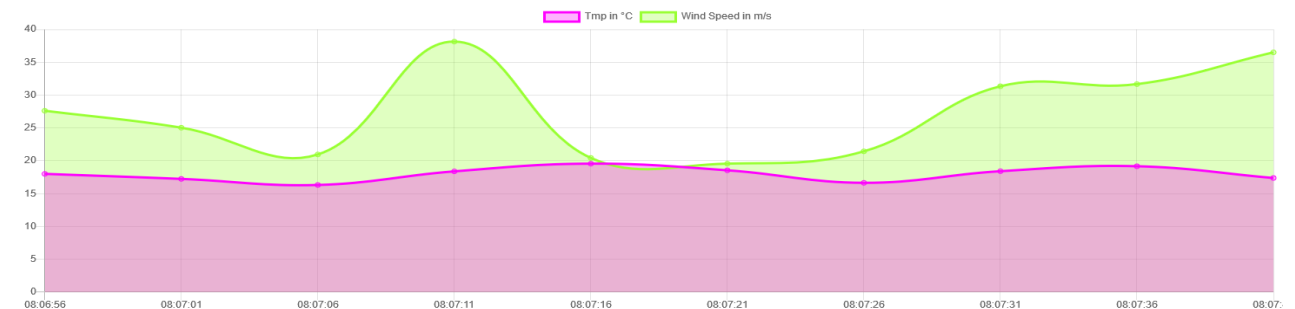
Methodology of the Framework

- Used Angular as a Framework
 - Allows for Single Page Application (SPA) approach
 - „A SPA is a web application that interacts with the user by dynamically rewriting the current web-page with new data from the web-server [...]“
- Also used a small backend
 - Answering calls from the SPA
 - Responsible for pre-processing of data

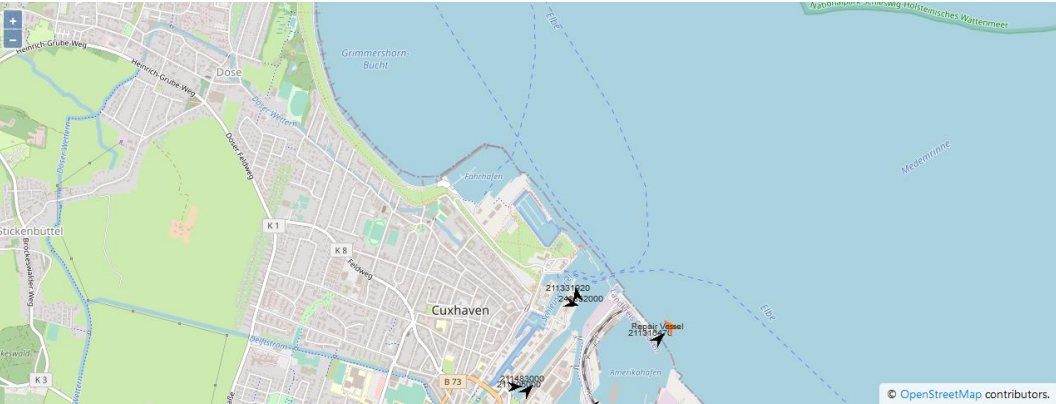
Dashboard



Weather Data of the Site



Implementation KUES



Selected Ship

MMSI: 12345678

Name: CTV

Destination: Cuxhaven

Persons: 7 People

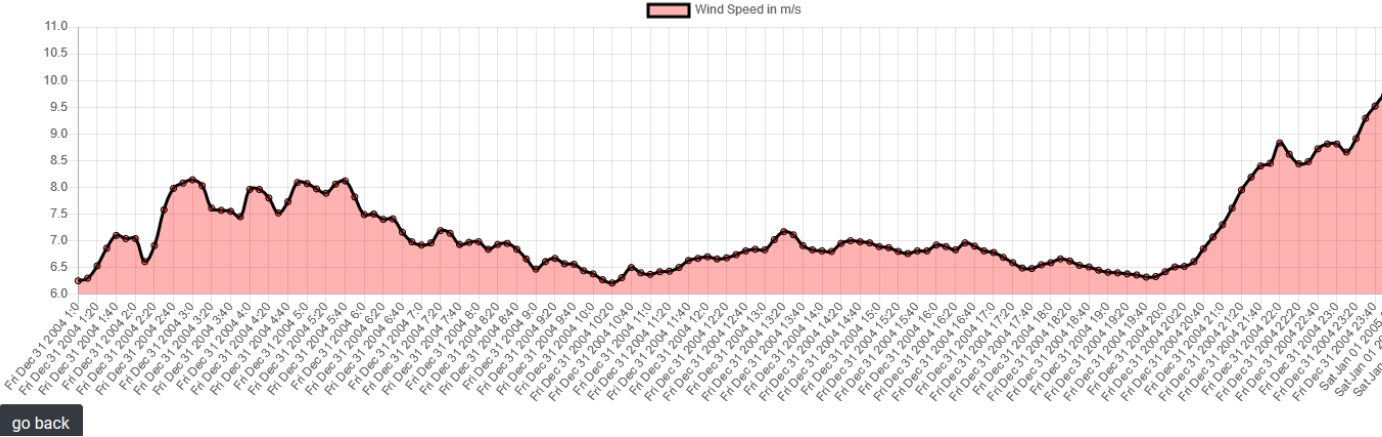
Speed: 30km/h

Longitude: 8.718585894094577

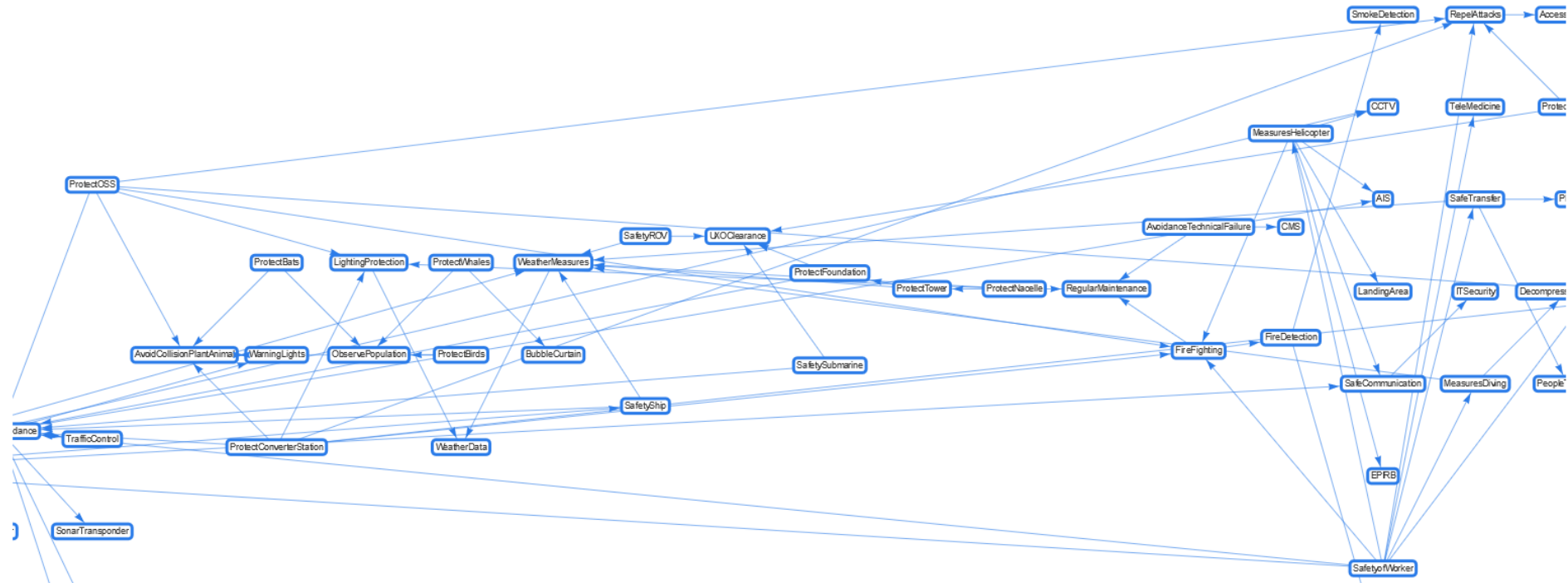
Latitude: 53.867742303265835

Wind Speed Rated Power Output Score Power Output Corrected Score

1 Day 3 Days 7 Days 14 Days



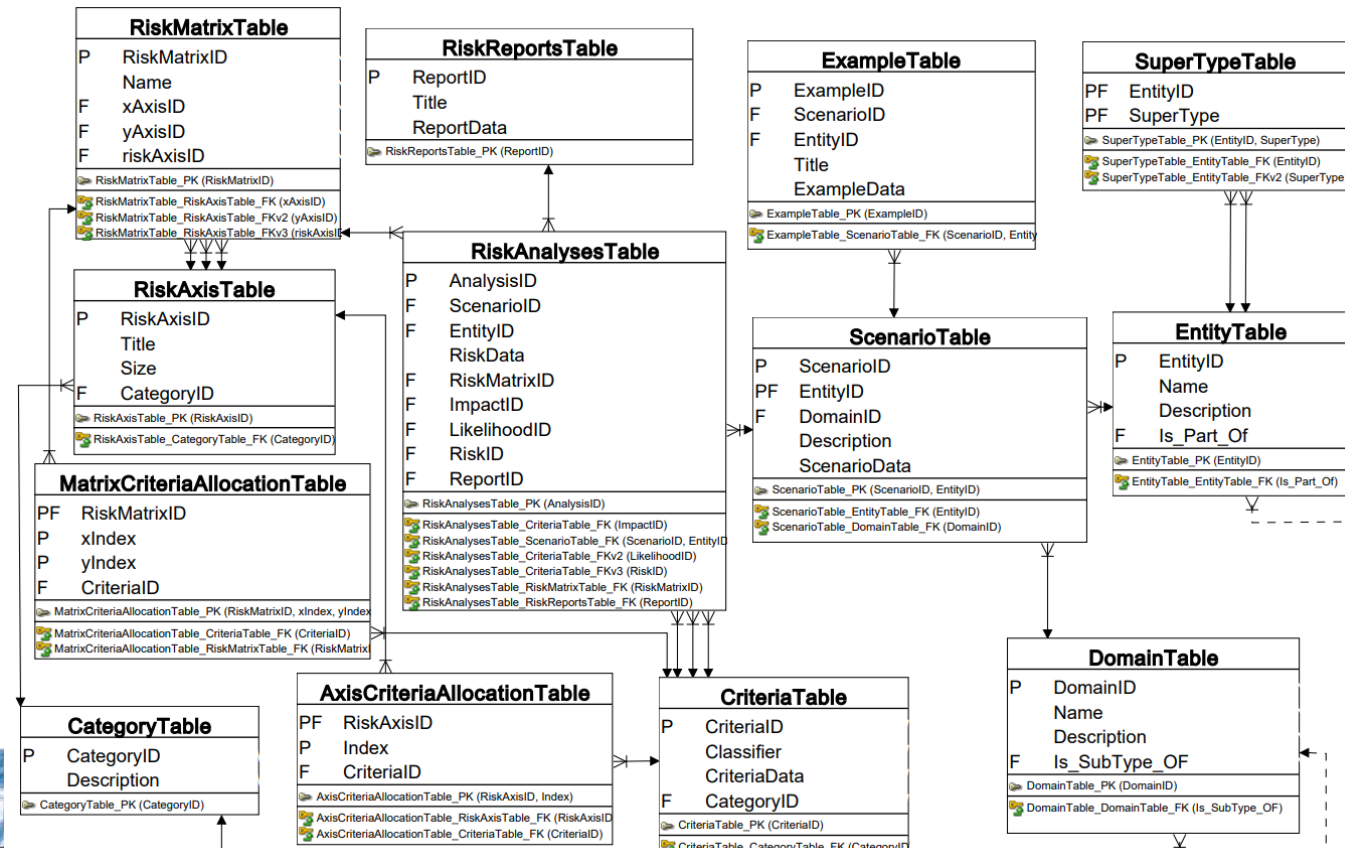
Implementation KUES




#	Node Name	Failure Rate	#	Node Name	Failure Rate	#	Node Name	Failure Rate	#	Node Name	Failure Rate
1	ProtectFish	0.0050	17	RegularMaintenance	0.0050	33	SafeCommunication	0.0151	49	SafeTransfer	0.0050
2	ProtectBats	0.0050	18	PLB	0.0150	34	Trainings	0.0050	50	PreventEspionage	0.0050
3	MeasuresHelicopter	0.0051	19	AvoidManipulation	0.0050	35	ProtectCable	0.0050	51	CollisionAvoidance	0.0050
4	LightingProtection	0.0050	20	TrafficControl	0.0050	36	PPE	0.0150	52	ProtectNacelle	0.0151
5	SafetyROV	0.0201	21	ProtectBirds	0.0050	37	EPIRB	0.0050	53	ITSecurity	0.0150

Introduction Risk Register

- A Database to store Entitys, Reports and Scenarios
 - Risks are assigned by the user based on data
 - User should compare current risk to stored risks and assess the situation
 - Theory and Database model were created by Dr. Arto Niemi
- Main goal -> Create a user friendly GUI
 - Search data and represent it for the user
 - Add new data
- Again Angular was used with a Python (Flask) backed



Implementation Risk Register



Deutsches Zentrum
DLR für Luft- und Raumfahrt

[Search Database](#) [Add data](#)

>> [Personnel member](#)

Entity: Personnel member

A person who is present in a professional context.

—	Report: Quantification of Occupational Safety for Offshore Wind Farms	Scenario: A member of personnel is hit by ice falling from a wind turbine blade
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Domain	Likelihood	Impact	Risk
Personel safety	Rarely occurs	Fatality, extensive or catastrophic damage	RGB: 255000000 description: Unacceptable residual risk which requires further safety measures

[Report: Quantification of Occupational Safety for Offshore Wind Farms](#)

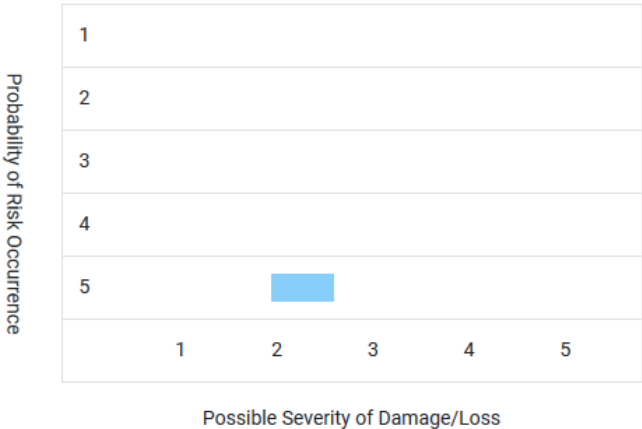
[author: Jennifer Mielniczek](#)

[school: Jade University of Applied Sciences](#)

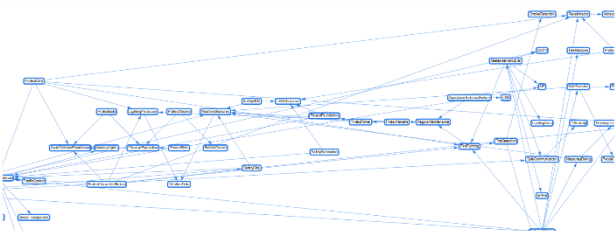
[type: Master Thesis](#)

[year: 2019](#)

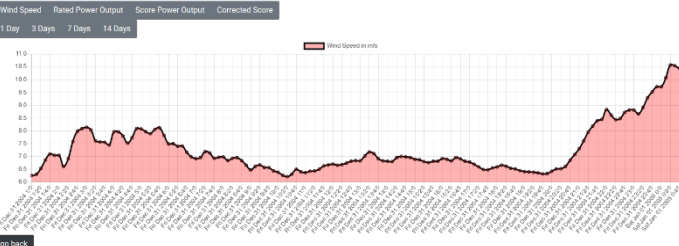
[Scenario: A member of personnel is hit by ice falling from a wind turbine blade](#)



Visualization of the Framework



#	Node Name	Feature Rate	#	Node Name	Feature Rate	#	Node Name	Feature Rate	#	Node Name	Feature Rate
1	Protection	0.050	17	SupportInfrastructure	0.050	33	SolarCommunication	0.011	48	SolarTransfer	0.050
2	Protection	0.050	18	IR	0.050	34	Training	0.050	50	ThreatDetection	0.050
3	Measurement	0.050	19	AcousticDetection	0.050	35	PowerCable	0.050	51	CollisionAvoidance	0.050
4	LightingProtection	0.050	20	TrafficControl	0.050	36	PIR	0.010	52	ThreatLoad	0.010
5	SolarAOV	0.020	21	ThreatBids	0.050	37	PIR	0.050	53	ITSecurity	0.010

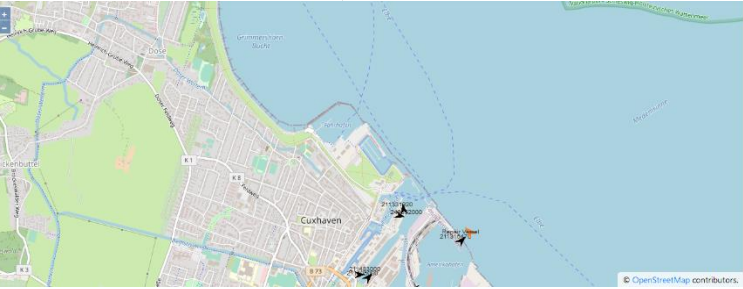


Wind Speed Rated Power Output Score Power Output Corrected Score

1 Day 3 Days 7 Days 14 Days

Wind Speed in m/s

go back



Selected Ship

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Destination: Cuxhaven

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Longitude: 8.71858594094577

Latitude: 53.867742303265835

Dashboard

critical 1

warnings 10

ok 19

Summary

Warning 1: Risk for unacceptable risk of being lost

Warning 1: A01 transmitter failed, risk for collision

Turbine 1: Electrical frequency unacceptable harmonic resonance

Turbine 2: Unauthorized Person gained access to the network/system

Turbine 2: Sea cable damaged, all systems are shut down

Turbine 2: Electrical frequency unacceptable harmonic resonance

Turbine 2: Risk of leakage/environmental pollution

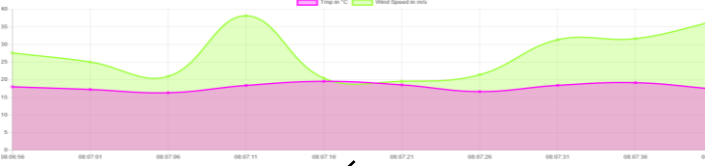
Turbine 2: Unauthorized Person gained access to the network/system

Turbine 3: A01 transmitter failed, risk for collision

Turbine 3: Electrical frequency unacceptable harmonic resonance

Turbine 3: Unauthorized Person gained access to the network/system

Weather Data of the Site



EntityName Type your search here Search Search All

Boat

Cargo ship

Coastal region

Passenger ship

Personnel member

Project

Project planning and preparation

Project stage

Ship

Subsea electricity cable

The Titanic

Deutsches Zentrum für Luft- und Raumfahrt

Search Database Add data

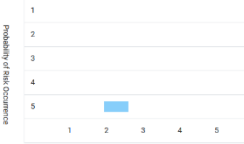
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Domain	Likelihood	Impact	Risk
Personnel safety	Rarely occurs	Fatality, extensive or catastrophic damage	HGB: 2500000000 description: unacceptable residual risk which requires further safety measures

[Report: Quantification of Occupational Safety for Offshore Wind Farms](#)
author: Jennifer Mielczarek
school: Jade University of Applied Sciences
type: Master Thesis
year: 2019

Scenario: A member of personnel is hit by ice falling from a wind turbine blade





Conclusion

- Web applications are very flexible
 - As an example the map could also be used for (air) traffic visualization
- Allows for more interaction with data
- „Low“ entry level
 - Requires a bit of knowledge in TypeScript and Python
 - After this a lot of existing librarys can be used
 - JavaScript for easy front-end visualization

Thank you for your attention!



Questions

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